

# **North to Alaska!**

## **INSPIRE Joins the BBC Radio in Creating a Radio Documentary Called “Songs of the Sky”, The Sounds of the Aurora**

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Around the middle of 2003, Bill Taylor, President and Co-Founder of INSPIRE, was contacted by Kate Bissell, radio producer with All Out Productions, Manchester, England (<http://www.allout.co.uk/home.aspx>). Kate was researching a proposed program to be aired on BBC Radio 4 (<http://www.bbc.co.uk/radio4/>). The radio program was to be called “Songs of the Sky” and the topic was to be the audible sounds associated with the aurora. Kate had found the INSPIRE website and contacted Bill to find out more about natural radio signals and their possible connection to the aurora. This initial contact led subsequently to an invitation for INSPIRE to participate in the creation of the radio documentary. The plan was to meet in Chatanika, Alaska, north of Fairbanks in late March 2004..

INSPIRE was represented by Bill Taylor, space physicist, Shawn Korgan, amateur scientist and natural radio researcher, and Bill Pine, high school physics teacher. All Out Productions was represented by Kate Bissell, producer and recording operator, and Adam Fowler, interviewer and narrator. When we met in Alaska, we had no idea of the adventure that awaited us. The following is a compilation of the reports on the trip by Bill Taylor, Shawn Korgan, and Bill Pine.

### **Saturday, March 20, 2004**

Bill Taylor

I had some expectations about my trip to Alaska that were grandly fulfilled: seeing the aurora and listening to its natural radio at the same time, meeting and enjoying three new, wonderful people, Shawn Korgan, Kate Bissell and Adam Fowler, and participating in the creation of a BBC radio show “Songs of the Sky”, which I hope will bring many new people into the world of natural radio and INSPIRE. The unexpected experiences I will also treasure about my trip to Alaska are meeting many wild and wonderful people of Alaska and having my preconception of the audible aurora turned around.

Bill Pine, Shawn Korgan and I met on the plane in Anchorage that was to take us to Fairbanks. It was late when we got to the Chatanika Lodge, where we stayed and took just enough time to test our hand held receivers at the lodge to determine that the power line noise was too strong and we weren't able to hear anything but 60 Hz and harmonics. We went to bed, exhausted from our trips of up to 19 hours.



Shawn Korgan

It was a very memorable and worthwhile experience to be part of the group which had the privilege of flying to Fairbanks, Alaska, to study the northern lights and record the sounds of VLF (very low frequency) radio signals which occur simultaneously with the aurora borealis, the northern lights.

Saturday, 3/20/04 - This was the day that we had anticipated for several months when we would begin our journey toward the North Pole where the sounds of the northern lights are often greater in amplitude and where the aurora frequently dances across the sky.

It was great to meet in person Bill Taylor and Bill Pine, to share experiences and to prepare for recording the sounds of the northern lights. Shortly after we arrived in the late afternoon in Fairbanks, we decided to check into our rooms and rest a while after the long flight we had endured. After resting, we decided testing our receivers would be appropriate and headed out on a short walk with our receivers in hand to test VLF listening conditions in Alaska. We were surprised at the amount of AC hum we received even after walking a distance of

approximately one-quarter mile from the Chatanika Lodge (located along the Steese Highway) where we were staying.

As we were walking around with our receivers, we noticed a distinct glow to our north. We questioned ourselves whether this was the northern lights or simply the last lingering light after sunset before twilight. In upcoming days, we would learn that the northern lights usually begin with a faint sky glow to the north before turning into a band across the sky or into more complex light patterns.

By the end of our walk, we all realized the next day we would have to scope out the land for a quiet listening location free of AC interference.

Sleep came slowly as I anticipated the activity in the days ahead and as I contemplated the possibility of recording all night during our stay in Alaska.

Bill Pine

After a 40 minute drive north out of Fairbanks, we arrived at Chatanika, Alaska. The front door of the Chatanika Lodge opens into a large room with a bar extending away from the door with a dining/dancing area beyond and another dining area in a room to the left. The decorating scheme is hard to describe. The walls were covered with all kinds of items from Alaska: guns, traps, mounted animals, cooking utensils, framed art, and the list goes on. The ceiling is covered with signed dollar bills left by past visitors.



Chatanika Lodge



There were a dozen or so people at the bar and at the tables nearby. They, of course, looked up when the door opened, looked us over, then resumed their conversations. The noise level was cheerful and these people obviously knew one another. We were looking for the “office” to check into our rooms. Turned out we were in the “office” – the reservations were kept on a spiral binder under the bar. MJ, the waitress, checked us in and directed us to park on the side of the lodge to carry our bags inside.

The lodge is described as “rustic” and that is accurate. Bathrooms are down the hall and rooms are furnished sensibly with well-used furniture. That being said, another description would be “charming”. There is very little about Chatanika Lodge that resembles other places I have stayed. Many places I have stayed in my travels have been nicer and certainly more luxurious, but none has felt more like home.

**Sunday, March 21, 2004**

Bill Taylor



A moose a few miles up the Steese.

We were up early the next morning and drove about 40 miles NE to a summit on the Steese Highway, testing sites along the way. I heard chorus live for the first time, all morning! We found a great place about 15 miles along the highway where we observed for the rest of the trip. When we got back we had lunch and then walked to the gold dredge across the highway from the Lodge. We then relaxed and met a bunch of characters at the bar in the Lodge. There were people who had worked on the dredges and mined gold, those who were currently prospecting for gold, Ron and Shirley Franklin, who own and run the Chatanika Lodge, and several other locals.

Kate Bissell and Adam Fowler arrived in the mid afternoon. We got acquainted and briefed them on what we had done and found so far. Kate was the consummate radio producer; it seemed like she always had her microphone and minidisk recorder with her and she would whip



them out at the slightest provocation to record stories from the locals, or descriptions of why we were there. Adam was the narrator, the voice, the talent; he was always ready to ask us leading questions to get us revved up about our interests and why we were there.

In a while three old friends and a new one arrived for a planned dinner at the Lodge. The old friends were Don and Betty Carpenter from California and Vikas Sonwalkar from Fairbanks. Don is a long time (50 years!) VLF observer and scientist from Stanford University. Don and Betty were visiting Vikas and his wife, Sushma. Vikas is a VLF researcher at the Geophysical Institute of the University of Alaska at Fairbanks. I had not met Sushma before so there was the other new friend. We had a wonderful dinner while a folksinger provided the entertainment at the Lodge.

Shawn Korgan

On this day, we spent most of the morning traversing Steese highway (a highway mostly free from power lines), surveying the area for quiet VLF listening locations. By mid-day we had located a great listening spot just beyond mile marker forty-eight along the Steese Highway. This would be the spot for all our listening endeavors in the days to follow. During our drive we had great discussions regarding the VLF hobby. Bill Taylor and Bill Pine also reminisced with each other about the past.

During our stops along the Steese Highway, we heard chorus on our VLF receivers at high noon! I would rate the strength of the chorus (on a scale of 0 to 5) at about 1. At lower latitudes it would be nearly impossible to receive chorus at noon except during strong magnetic storms. No magnetic storms were in progress in Alaska during the chorus we received at noon. Also very noticeable at this time were the ALPHA navigational signals that originate from the former Soviet Union. These signals were all strong and clear!

Late Sunday afternoon Kate Bissell and Adam Fowler arrived. After we had a chance to get to know each other, we discussed our plans for the days ahead. Our schedules would be busy with late night aurora watching and VLF recording sessions to daytime interviews and visits to VLF sites of interest in the area. Also on our agenda, we planned to meet with several VLF enthusiasts interested in setting up a live VLF audio stream on the Internet from Alaska!

We were pleasantly surprised to have Professor Vikas Sonwalkar and his wife Sushma along with Professor Don Carpenter and his wife Betty join us for dinner. Professor Sonwalkar mentioned to me that I might capture auroral hiss that occurs concurrently with brightening aurora. Sure enough, I would capture several faint examples of this high latitude auroral hiss before leaving Alaska.

Bill Pine

Returning from our morning journey, we met in the dining room for a late breakfast. There were several people dining and at the bar. After a while, Kathy, who had heard a brief description of why we were there, approached us with a question about power generation. We had some thoughts on the topic and that led her to call her “old man” Mike over to hear some of our ideas. Mike’s gold mining partner, Allen, also joined us and we talked for well over an hour

about gold mining, natural radio, the aurora, life in Alaska, and life off the power grid. Two things that surprised me were that there is still gold mining going on in Alaska and that Alaskans claim that you can hear the aurora under the right conditions.

Mike has been working his claims for the past several years and he makes his living by finding gold. Allen has a claim that he will start working this summer. He has been in Alaska for just nine months, but he loves it. We found out later that there is a large commercial mining operation called (appropriately) Fort Knox that takes out 1000 ounces of gold per day. Mike and Allen assured us that there is far more gold remaining in Alaska than has ever been taken out. I believe it.

My attitude about hearing the aurora has always been that it is a myth. I can't picture any sound generating mechanism that would transport sound from the altitude of the aurora to be heard immediately on the ground. My attitude has changed. Almost without exception, the locals reported hearing sounds from the aurora under the right conditions. These conditions involve low temperatures (-50° F) and strong, dynamic aurora. The sounds reported vary from rustling sounds to popping sounds and the sounds occur as the display changes.



Kate Bissell, Bill Taylor, Adam Fowler, Bill Pine

Bill Taylor

I've seen the aurora a few times before this trip, from Poker Flat Research Range, a mile NE of Chatanika Lodge, where I flew sounding rockets over the aurora in the 70's as a post doc, and from Minnesota, where I was a post doc. The ones we saw on our trip to Alaska, north of Fairbanks about 50 miles, were the best I've seen. (Troy Birdsall, a native and experienced aurora watcher, put them at a 3 or 4 on a scale of 10 – but they were still impressive!)

When we came out of the Chatanika Lodge after dinner to head for our observing site, Bill Pine looked up and pointed and said, "There is the aurora." I said no, that's a cloud. But was I wrong! It was a very bright aurora, one that could be seen without any dark adaptation to our eyes. We were STOKED! So we ran back into the lodge to get our gear and headed north, beyond the power lines. We saw aurora and listened to and recorded chorus, hiss, tweeks and sferics until we ran out of steam, after midnight, and came back to the Lodge.



### Dinner at the Chatanika Lodge

Adam Fowler, Kate Bissell, Bill Taylor,

Don Carpenter, Betty Carpenter, Sushma Sonwalkar, Vikas Sonwalkar, Bill Pine



Shawn Korgan

Sunday night, we were all surprised to hear from someone in the lodge that aurora was in progress and that it was even visible at our lodge with the outside lights turned on! A quick glance outside revealed that sure enough, aurora was in progress. This appeared to be the beginning of what could be a very interesting night of activity. At this point, we all gathered up our equipment and started on the twenty mile journey to our predetermined VLF listening spot along the Steese Highway.

As we traveled to our listening spot, the aurora was generating an impressive display. A scene similar to smoke rising from the horizon developed into an arched band of light which then proceeded to stretch across the entire sky from east to west. At times, vertical columns or rays of light would be seen shooting up into the midnight sky and on one occasion there was even faint sheets of greenish, white light rising vertically upward out of the bands of light stretching between the horizons.

With all this aurora activity, we were surprised to receive little in the way of VLF activity on our VLF receivers. At my home location in northern Colorado, whenever visible aurora have occurred it has always produced terrific VLF sounds ranging from a high rate of low frequency, low-dispersion whistlers to moderate strength chorus to strong hissbands. Why should it be any different in Alaska?

At best, we heard a faint hissband, a couple of risers and a few faint whistlers with an echo or two. This was the peak of the VLF activity during our aurora display. Spherics were constant as usual and tweeks had a slightly lower frequency ring to them in Alaska than they do in Colorado.

During this recording session, I laid a three hundred foot piece of shielded wire upon the pavement as my long wire antenna. I used the ground of our vehicle as the ground or counterpoise for the VLF receiver. Bill Taylor on the other hand had suspended a large eight foot loop antenna from several small trees. As we compared the audio from a VLF-3 receiver (tied to the long-wire antenna) and the audio from the loop receiver, it was noted that the VLF-3 receiver had the best signal. The loop receiver had slightly more white noise which masked the fainter chorus which was occurring. Approximately thirty minutes later, the loop receiver began to develop a crackling, popping sound to it and an occasional whine or screech type sound. I falsely assumed at the time that this was due to water getting into the cables as several of them were laid directly on the snow.

Within approximately an hour of the loop receiver being setup, the audio had changed from a rather decent signal to a crackling, popping and an occasional whine type sound to absolute white noise! It now appeared there was a definite problem with the loop receiver. At this point in time, the e-field receiver also began to experience a faint crackling and popping type sound. I decided to check the long wire antenna connections for any possible moisture buildup in the coax connections feeding the VLF receiver. The connections appeared clean and upon returning inside the vehicle the crackling and popping type sound had disappeared from the audio in the e-field receiver.

At this point, I personally was still under the assumption that water had somehow seeped into our wiring. What else could possibly explain the crackling, popping and occasional

whine type sound we had heard in the output of the loop receiver and then later in the output of the e-field receiver? And what could explain the sudden entire dysfunction of the loop receiver?

At this point, it might be worthy to note that faint LORAN interference was noted in the output of both my homemade SK-1 VLF receiver and also in the VLF-3 receiver.

It was getting late so we decided to make the twenty mile drive back to the lodge and get some needed rest.

Bill Pine

I had never seen the aurora and I did not know what to expect. I have, of course, seen photos, but the actual aurora has features that cannot be captured by still photography. Sometimes it looked like curtains rippling in a breeze; other times a bright region would form and move along the arc. It was fascinating and awe inspiring. It was also cold. Nighttime temperatures were about 0° F, not cold by Alaska standards, but plenty cold for this California boy! Daytime highs were around 20° F. By the end of our stay, the high temperature had climbed above freezing, announcing the arrival of spring. Fortunately, Kate and Adam had rented a motor home, so we could use that as a base to get warmed up every once in a while.

### **Monday March 22, 2004**

Shawn Korgan

Early Monday morning, we returned to our VLF listening location for a listen to VLF conditions, to set up a better long wire antenna and also to check out the condition of the loop antenna and receiver. As there were short trees along the parking lot, we decided to hang a long piece of shielded wire (approximately three hundred feet in length) in the treetops. In an effort to achieve better success capturing the faint VLF signals, we also laid out approximately three-hundred feet of shielded wire in the opposite direction as a counterpoise which would tie to the ground of the VLF receiver.

Upon connecting the newly designed antenna to several e-field receivers, it was determined to be a success! We were instantly awarded with great sounding chorus again toward mid-day! I rated this chorus at about a strength of 2.

Next, Bill Taylor had brought along a small portable loop antenna to test the loop receiver. Upon connecting this small loop antenna, nothing was heard except static or white noise in the reception. This felt almost like *deja vu* from the experience with the large loop antenna the night before. We were unsure what had occurred to the loop receiver, although I remembered a question Bill had posed the night previous as to whether the e-field receiver was protected. I assumed he meant from static electricity at which point I responded yes. The VLF-3 receiver was designed to withstand accidental low voltage DC across the input and also to ground most high value AC voltages encountered in the field (excluding lightning of course). By this question, I also assumed the loop receiver must not be “protected”. The large loop antenna was disassembled at this point due to the non-functioning loop receiver.

After we arrived back at the lodge, we had a chance to talk with several local residents,

including the owners of the lodge, Ron and Shirley Franklin, regarding the audible sounds people claim to have heard with their ears from the northern lights. From this point onward, Kate Bissell and Adam Fowler found a continual stream of local residents to interview who claim to have actually heard sounds caused by the northern lights with their ears. The local residents in the area and also the visitors at the lodge were extremely courteous and very willing to help in any way possible with our project.

Once again meeting up with Kate and Adam at the lodge, we decided to visit the Mt. Aurora viewing range and lodge. Mt. Aurora is an ideal location to view the aurora with its elevation above the surrounding terrain. This also makes it a prime location to receive radio signals generated by the northern lights. Troy and Stephen Birdsall currently operate a live web camera ([www.aurorawebcam.com](http://www.aurorawebcam.com)) upon which the aurora occurring north of Fairbanks, Alaska can be viewed online during the aurora season. It just so happened that Troy had recently researched into the possibility of streaming live audio from the northern lights onto the Internet simultaneous with the live video stream already in operation! If this were to develop, it would be a one of a kind operation and the first of its nature in existence that I am aware of. After we tested several possible locations for a VLF receiver, it appeared likely that a live VLF audio stream from Mt. Aurora would be a possibility although some processing of power line interference would have to be performed to eliminate unwanted interference.

Monday night, we once again leave the comfortable surroundings of the lodge to head out into the dark, cold Alaska night to do more aurora watching and VLF recording. Aurora was once again in progress and similar in appearance to the night before.

Late this night, I planned to stay up and record VLF audio and watch the aurora the entire night! I figured this was a worthwhile endeavor after making the long journey from Colorado. Due to lack of activity, I had recorded relatively little VLF activity so far. I could not imagine arriving back home with little if any VLF audio from Alaska! After I spoke with everyone else, it was agreed that I would stay and record the sounds of VLF during the night while the rest of the group would take the second vehicle back to the lodge.

During the night, I would capture some of the best VLF audio since we had arrived in Alaska. This would include whistlers, sudden short increases in hissband which corresponded to brightening aurora and also low frequency chorus. The aurora became particularly active during the night with a curtain stretching upward into the sky for over fifteen minutes at one point. Rays of light were constantly shooting upward into the sky which had a similar appearance to a car's headlights or to a very bright spotlight shining upward into the sky. On several occasions whistlers would occur just previous to these rays of light suddenly appearing.

During this particular night, HAARP was conducting air glow experiments. They were attempting to create patches of light by heating various portions of the earth's atmosphere. The VLF modulated HF transmissions were inducing VLF radio signals in the VLF band. These transmissions were distinctly audible on the VLF receiver and included various steady tones and frequency ramps (rising tonal emissions).

Bill Pine

Monday evening at the Lodge, things were quieter. I met Butch, a pipeline veteran of 22



years who is now retired. He had many interesting tales of working on “The Slope”. It was a tough environment with temperatures as low as  $-70^{\circ}\text{F}$  with a wind chill on top of that. I was surprised to learn that work on the slope happens mostly in the winter when the frozen ground gives good support. I also met Neva, who works at the nearby Poker Flat Rocket Range. Neva lives at Mile 42 on the Steese, past the end of the power grid. She agreed to arrange a tour of Poker Flat the following morning.

About 10 PM we headed up the highway to our observing site. I had been having problems every session with my VLF3 receiver. When I first turned it on, it worked fine. After about a half hour, the signal strength would fade and in a few minute it would quit altogether. Between sessions I would change the receiver and check out the one that had failed. The “failed” receiver checked out just fine every time. It was a mystery.

Bill and Shawn were having some equipment problems, too. This was no surprise since experience has shown that Murphy accompanies all field trips so that he can impose his law! Bill and Shawn were able to troubleshoot their equipment and keep it running. Their receivers were inside the motor home while mine was outside stuck in a snow bank. It occurred to me that maybe my problems arose from the cold temperature that the receiver and tape recorder were experiencing.

## **Tuesday, March 23, 2004**

Bill Pine

Tuesday morning we headed for Poker Flat Rocket Range. We were late leaving the Lodge due to many conversations that had to be concluded. Neva let us in the gate and, when we arrived at the Science Center, she called Brian, the staff scientist, to show us around. Brian is from New Zealand and his job at Poker Flat is to provide coordination between the equipment of the sounding rockets and the interfaces at Poker Flat. The tour was great. Brian was quiet at first, but soon warmed up and provided a wealth of information. We found out later that most tour groups only ask things like “How cold does it get here?”. Our questions were better than that and I think Brian enjoyed showing us around.

Bill Taylor

Tuesday afternoon we visited North Pole High School, just outside of Fairbanks, and met Curt Szuberla, a physics and math teacher there, who is an INSPIRE participant. He is also a PhD space physicist and is planning to install a VLF-3 near the high school and stream its output onto the Internet. We are looking forward to our first high-latitude streaming site! But Curt has some competition for the first high latitude VLF stream – Troy Birdsall. Troy runs an aurora webcam from his family’s property near Mt. Aurora, a few miles south of Chatanika Lodge. See his website, <http://www.aurorawebcam.com> He also plans to put a VLF-3 on the property and stream VLF simultaneously with the aurora images.

Adam and Kate also interviewed several people who have heard the aurora with their ears. Most of them haven’t talked about it much because they think that others will think they are

crazy! As I mentioned, I was skeptical, but after hearing very similar reports from them, I've become a believer. I've also done a little Googling on the topic and am even more convinced that it is real. Really tough to record, but real. The anecdotes go like this: It's a very cold night, -40 degrees or below, the aurora is very strong, and synchronized with its dancing is a hissing sound and sometimes crackling.

A possible theory for audible aurora is that the aurora creates a vertical electric field in the atmosphere to over 10 kV/m, up from the 100 V/m fair weather field that exists world wide all the time. The electric field of the VLF waves from the aurora adds to this electric field. The total electric field is high enough to cause coronal or brush discharges from points, such as pine needles, snow or even human hair, perhaps in ears. Coronal discharges are audible and the VLF waves will modulate the discharge. There are even reports of recordings of sounds from aurora, but I have not seen scientific reports of the recordings.

Bill Pine

While talking to Curt, he showed us his field setup that his students take out for observations. He carries the receiver and recorder in an ice chest. Next time I go to Alaska, I will carry my equipment in an ice chest – to keep it warm!

Shawn Korgan

By morning, low frequency chorus was in progress as the rest of the group pulled up from a refreshing night of sleep. In the sky overhead appeared a bright sundog on the west side of the sun and a fainter sundog on the east side of the sun. The snow glistened brightly in the crisp morning air. After we had monitored the chorus on our VLF receiver for about an hour and after we had viewed the scene, we decided to head back to the lodge. This would turn out to be the last time we would attempt to record sounds from the northern lights. I was glad I had opted to stay up an entire night to record VLF activity!

Later this day, we visited the North Pole High School a second time after confirming a good time to meet with Curt Szuberla. Meeting up with Curt Szuberla, we discussed the possibilities of setting up an online VLF audio stream from the North Pole High School. We hiked at least one-half mile to a location we thought might make a good location for a VLF receiver. It turns out that a location close to the school was actually a better location for a VLF receiver due to less power line interference and due to the possibilities of simpler equipment installation. As with the case of Mt. Aurora, some type of processing of the audio signal would be necessary to eliminate unwanted power line interference before streaming the audio onto the Internet.

We also had a chance to tour the Poker Flat missile range where many experiments are performed annually on the aurora.

This evening we said our goodbyes to Bill Pine who had to leave a day earlier than Bill Taylor and myself. To end this evening, we viewed faint aurora from the top of Mt. Aurora before turning in for the night.

Bill Pine

Tuesday night I stayed at Pike's Waterfront Lodge on the Chena River in Fairbanks. Pike's is a beautiful new hotel and I wished I was at the Chatanika Lodge. Wednesday morning meant another day of travel back to reality.

**Wednesday, March 24, 2004**

Shawn Korgan

On this morning, Kate Bissell and Adam Fowler would interview me for the final time before we packed up our luggage in preparation to leave the lodge. We said our goodbyes to the lodge owners on the way out.

As Kate and Adam had several private interviews to perform, Bill and I had a chance to stop by the University of Alaska Museum. Later this evening, we would eat our final meal together. Bill and I said our goodbyes to Kate and Adam. It is always hard to say goodbye to new friends who live halfway across the world! Kate and Adam will continue onward to Galena, Alaska, to speak with Alaskan natives regarding myths and legends on the northern lights while Bill and I have early morning flights back home.

After arriving home, it was hard to return to work. It was as if going back to work would undo the experience of our expedition to Alaska.

Over the course of the next several days, I pondered over the unusual problems we had experienced in Alaska with our VLF receivers.

Bill Taylor

The trip was a magical experience for me, on many levels, and I will treasure it always.





Ron's 1979 Harley Dresser Touring Bike



Ron's 1955 T-bird Convertible



## Our Hosts at the Chatanika Lodge Ron and Shirley Franklin

On behalf of The INSPIRE Project, Inc. and All Out Productions, we would like to thank our hosts at the Chatanika Lodge and all of the wonderful people of Alaska for their warmth and hospitality. We will return.

Kate, Adam, Bill T., Shawn, Bill P.